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# INFORMATION

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## GLASS COLLECTION AND PROCESSING IN JAPAN

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The word "recycling" is understood to mean different methods of processing secondary raw materials and reusing products, starting with recycling domestic trash and ending with processing and reuse of different kinds of articles and packaging materials. These forms of recycling all pursue the same goal — creating the conditions and possibilities for the survival of society.

For a long time now glass containers everywhere have been reused repeatedly (recycling has been practiced). For example, in Japan, the highest-quality sake at first, then lower-quality sake and finally frying oil were poured into large sake bottles. Beer bottles are still sometimes reused, but in recent years there has been a trend toward avoiding reuse of glass containers for food and alcohol products.

In Japan glass bottles are recycled mainly by two methods. One is reuse as glass containers and as cullet in glass plants. Cullet, like secondary raw materials, must meet definite requirements: no foreign impurities, sorting by color, and others. For this reason, not all collected bottles are reusable and as a result they were discarded in a dump.

A technical process making it possible to produce on the basis of domestic glass waste a new type of ceramic tile, which can be laid on sidewalks or used for the facing of buildings, has been developed at the Tokyo firm "Crystal Glue" [1]. This product has many advantages. It is produced using broken glass, which does not need to be sorted by color. The glass content in a tile is 70%, and this decreases the amount of clay added, which in turn conserves valuable natural material.

The technological process developed and the plant built for this technology made it possible to use for subsequent processing bottles and other glass wastes from local autonomous enterprises and stores selling alcoholic beverages. After the undesirable impurities have been removed the glass is crushed, comminuted into powder, and mixed with clay. Tiles are pressed from a mixture under high pressure. The tiles are fired at temperature 1000°C.

In the new technological process tiles are fired at comparatively low temperature 1000°C, which is 200°C lower than the temperature required in the previous technology. This makes it possible to conserve energy and decrease carbon dioxide emissions in the firing process by 26%.

In summary, the company produces ecologically clean, effective articles at lower prices, which allow it to compete in the market.

It should be noted that in Japan this is the only enterprise whose 57 stockholders are occupied in one way or another with recycling. Among them are producers or distributors of alcoholic and nonalcoholic beverages packaged in glass bottles, some are wholesalers of alcoholic beverages, while others collect glass wastes and supply clay. Among them are also tile manufacturers who have sales channels set up and construction companies that use tile covers. They work in different sectors of the economy, but they all make their own contribution to the process of recycling wastes.

Such an integrated approach to the business attracts the attention of Japanese and foreign companies. The Crystal Glue Company receives many inquiries from organizations that want to study their methods, partner with it, and learn how to develop new materials from the wastes.

A venture company located in the Tiba prefecture in Japan has developed another method of processing glass with different colors [2]. It has developed a technology for processing containers made from glass of different colors, which previously had no secondary use and was salvaged at special sites. The company adopted its own novel technology for

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crushing glass, which imparted to the comminuted glass the properties of natural sand. The material processed into artificial sand is used in various fields — for ameliorating soil, laying pipe, and building sports fields at schools. Starting at almost zero value in 1999 the company has grown to $650 \times 10^6$ yen in 2007.

The new technologies for processing wastes from glass and bottle cullet make it possible to decrease the volume of wastes transported to special waste sites and thereby decrease the area of the sites and decrease the production of non-ore materials (clay and sand).

## REFERENCES

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2. *Proceedings of the Ecological Business Seminar*, Japanese-Russian Economic Center, Tokyo (2010).